## Space Weather Forecast

Issued on Thursday 3 October 2024 at 13:12 Local

**This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

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**Space Weather Forecast Headline: R1-R2 Blackouts expected, chance of further R3 Blackouts. G1-G2/Minor-Moderate Geomagnetic storms likely, Slight Chance G3/Strong storm days 2 and 3 (04-05 Oct).**

**Analysis of Space Weather Activity over past 24 hours**

**Solar Activity:** Solar activity has been Moderate with a number of Moderate class flares in the past 24 hours.

There are currently eight active sunspot regions on the Earth-facing disc. The most complex region resides near the south centre disc, with two delta spots present. The second most complex region is in the northwest close to centre disk, with an elongated delta spot in the trailing portion. The largest region is close to the northeast limb, but exact classification remains difficult due to its viewing angle. Two spots in the southwest are also of note, both with moderate magnetic complexity. The remaining sunspot regions are smaller and appear to be relatively benign.

A filament eruption (arc of plasma material) was observed 03/0630 UTC in coronagraph imagery, close to a sunspot region located near the northeast limb. This has produced a coronal mass ejection (CME) off the northeast limb, which is yet to be analysed.

The Strong flare on 01 Oct produced a CME, with an Earth-directed component expected later in the period.

**Solar Wind / Geomagnetic Activity:** Solar wind parameters were indicative of a slow regime. Solar wind speeds ranged between 290 and 380 km/s. The Interplanetary Magnetic Field remained at weak levels. The north-south component also remained at weak values. Geomagnetic activity was Quiet (Kp 1-2).

**Energetic Particles / Solar Radiation:** The count rate of energetic particles remained at background levels with no solar radiation storms observed.

**Four-Day Space Weather Forecast Summary**

**Solar Activity:** Solar activity is expected to be Moderate, with further Moderate class flares expected and a chance of returning to High should another isolated Strong flare occur.

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**Solar Wind / Geomagnetic Activity:** Slight chance of a glancing coronal mass ejection (CME) from 29 Sep on day 1 (03 Oct). Likely shock and glancing blow from the strong X-flare CME from 01 Oct on days 2 or 3 (04/05 Oct). In the absence of any CMEs, solar wind speeds should remain slow-ambient.

Quiet (Kp 0-2) geomagnetic conditions are expected days 1-2. There is a slight chance of Active to G1/Minor storms (Kp4-5) day 1 (03 Oct) from a possible glancing blow from the 30 Sep CME. Later day 2 and during day 3 (04-05 Oct) the possibility of the strong-flare CME arrival sees a likelihood of G1-G2/Minor-Moderate Geomagnetic storms and a slight chance of G3/Strong Geomagnetic storm.

**Energetic Particles / Solar Radiation:** The count rate of energetic particles is forecast to persist at background levels, with a slight chance of rising above should further notable flares occur during the forecast period.

## Geomagnetic Storms

| Geomagnetic Storm Probability (Exceedance) | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| **Minor or Moderate** | **G1 to G2** | No | 20 | 50 | 60 | 5 |
| **Strong** | **G3** | No | 1 | 15 | 20 | 1 |
| **Severe** | **G4** | No | 1 | 5 | 5 | 1 |
| **Extreme** | **G5** | No | 1 | 1 | 1 | 1 |

## Radio Blackouts - X-Ray Flares

| X-Ray Flares Probability | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| **Active** | **R1-R2 (M Class)** | Yes | 80 | 80 | 70 | 70 |
| **Very Active** | **R3-R5 (X Class)** | No | 30 | 30 | 20 | 20 |

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## Solar Radiation Storms (High Energy Protons)

| Radiation Storms Probability (Exceedance) | Level ($cm^{-2}sr^{-1}s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| **Active** | **≥ S1** | No | 20 | 20 | 20 | 20 |
| **Very Active** | **≥ S3 *** | No | 1 | 1 | 1 | 1 |
| * S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$) | | | | | | |

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